Chapter Eleven

PLAN DEVELOPMENT

BUREAU OF LOCAL ROADS AND STREETS MANUAL

Chapter Eleven
PLAN DEVELOPMENT - MFT and State Funds

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PLAN DEVELOPMENT – MFT and State Funds

11-1 PLAN PREPARATION

The local agency is normally responsible for preparing plans for local agency projects. Section 11-1 discusses the preparation of these plans for MFT- and State-funded projects.

11-1.01 Initiation

The designer is responsible for preparing the plans so that they can be accurately constructed in the field. To properly prepare the plans, the designer must have a well-defined scope of work. Form BLR 22120 can be used to define the design criteria for the project. In addition, at the beginning of plan development, the designer should review the project commitment file when applicable. This file should contain all commitments made to IDOT, other agencies, and the public during the development of the project.

The local agency is responsible for the design of structures in their projects. The work is generally performed by either in-house staff or by consultants. However, under some circumstances, the Bureau of Bridges and Structures (BBS) may prepare structure plans for the county.

605 *ILCS* 5/4-101.4 provides that IDOT must prepare bridge design plans and specifications for a county when requested to do so by the county engineer. However, scheduling is critical and sufficient lead-time must be allowed to perform this work. The use of qualified consultants is encouraged for all design projects, particularly for those projects on expedited schedules. The following guidelines are provided for making requests to the BBS for IDOT design assistance:

1. Request. The county should send a letter to the BBS indicating the proposed scope and schedule and requesting the services of the BBS. The Local Bridge Unit of the BBS will review the request and advise the county if the services can be provided within the requested time frame.

2. Timing. The lead time required will vary according to the complexity of the structure and availability of BBS staff. The request notification should be made no later than at the submission of the Preliminary Bridge Design and Hydraulic Report (PBDHR), and significantly earlier for non-routine type structures. This should allow sufficient time for the county to procure a consultant to prepare the design if the BBS cannot provide the requested services within the time period specified by the county.

11-1.02 Plan Types

Plans types may consist of one or more of the following:

1. Contract Plans. Contract Plans are typically prepared on 34 in x 22 in (D size) (864 mm x 559 mm) sheets that are considered full size plan sheets. Each sheet includes a borderline with a 2 in (51 mm) left-binding margin, 0.5 (13 mm) in right margin, and 1 (25 mm) in top and bottom margins. This provides a working area of 31.5 in x 20 in (800 mm x 500 mm).

   Contract plans may also be prepared on 11 in x 17 in (B size) sheets. Each sheet includes a border line with a 1 in left-binding margin and 0.5 in right, top, and bottom margins. This provides a working area of 15.5 in by 10 in (394 mm x 254 mm).

2. Abbreviated Contract Plans. This type of plan is adaptable to special types of projects (e.g., minor emergency repairs, safety improvements, resurfacing, restoration, rehabilitation, pavement marking). Abbreviated Plans may be included in the contract proposal when prepared on 8.5 in x 11 in (A size) (216 mm x 279 mm) sheets. They typically consist of only the information needed to describe the scope and type of work.

3. Structure Plans. Structure Plans are Contract Plans for highway traffic and drainage structures that require the seal of a structural engineer. Where appropriate, Standard Plans for precast prestressed concrete deck beam bridges may be used as an alternative to a custom design. These plans must be used without a modification of the standard design, unless the modified plans are sealed by an Illinois licensed structural engineer.

4. Lighting/Traffic Signal Plans. These plans are part of the Contract Plans and include details of any proposed lighting or traffic signal construction.

5. Right-of-Way Plans. These plans are the basic engineering documents for the acquisition of right-of-way and are developed to define the areas necessary to be acquired to construct and to maintain the highway improvement. They are drawn using the same size, type of sheets, and scale as the Contract Plans.

6. Utility/Railroad Plans. The utility and railroad companies use these plans to conduct the necessary relocations and/or improvements to their facilities. Typically, they are not included with the Contract Plans. When they are included, it is for information purposes only unless the work is to be performed by the contractor. If they are included in the Contract Plans, the drawings are the same size, type of sheets, and scale as the Contract Plans.

11-1.03 Plan Content

The designer should prepare the contract plans as simply as practical. Avoid the use of duplicated data and unnecessary cross-references. A description of the various plan sheets follows.

11-1.03(a) Contract Plans

Contract Plans should contain the following information:

1. Cover Sheet. A cover sheet is required for all plans. It identifies the project type, project location, type of funding, and other pertinent project information, and it provides a place for signature and seal of a licensed professional engineer, and for plan approval. It may also contain an index of sheets if an index is not included as a separate sheet.

2. Summary of Quantities. The Summary of Quantities should be placed on the Cover Sheet if space allows, otherwise, place it on a separate sheet following the Cover Sheet. The Summary of Quantities should show the appropriate quantity breakdowns based on the construction and safety work type, project location, funding sources, etc. Ensure that the wording of the pay items agree with the *IDOT Standard Specifications and Special Provisions*.

3. Typical Section Sheet. The following applies to the Typical Section Sheets:

   - Ensure that all applicable typical sections are provided. Note the title of the typical section and applicable stations directly below the typical section.
   - Include all General Notes applicable to the typical sections.
   - Note all applicable pay items on the typical section.
   - Include the structural pavement design information.

4. Plan/Profile Sheets. Include Plan and Profile Sheets prior to the Detail Sheets.

5. Traffic Control Plan. Provide for the handling of traffic through and/or around the work area. Where necessary, provide plan sheets showing lane closures and constrictions, construction staging, and detours.

6. Erosion and Sediment Control Plan. Graphically illustrate the locations of all temporary and permanent erosion and sediment control devices, including when they should be applied in relation to the sequence of construction operations.

7. Detail Sheets. Where necessary, details may be included. The following are typical examples of detail sheets:

- where the project involves a complex intersection;
- drainage details that are not covered in the *IDOT Highway Standards* or on the Plan and Profile Sheets;
- where there is a change in the roadway surface or base course width;
- Signing Plans, where applicable; and/or
- environmental mitigation plans (e.g., wetland plans), where required.

8. Traffic Signal Plans. Traffic Signal Plans should contain the following information:

- detail sheet showing the intersection layout and stationing;
- traffic volumes for all legs of the intersection;
- approaching and exiting travel lanes, turning lanes, shoulder, and median widths;
- proposed phasing diagrams;
- all roadway features that may affect the stationing or setback of poles (e.g., guardrail, barrier median, barrier curb, signs exceeding 50 ft^2 (4.5 m^2), driveways, culverts, railroads, pipelines);
- the approximate height of any power and telephone lines over the roadway;
- the location of all lighting poles and luminaries;
- the proposed location for the controller cabinet and signal posts;
- electrical distribution and control system designs, include wiring diagrams; and
- drawings of equipment, foundations, and electrical details.

9. Lighting Plans. Lighting plans should contain the following information:

- stationing at appropriate intervals;
- travel way, shoulder, and median widths at frequent intervals;
- all roadway features that may affect the stationing or setback of poles (e.g., guardrail, barrier median, barrier curb, signs exceeding 50 ft^2 (4.5 m^2), driveways, culverts, railroads, pipelines);
- the approximate height of any power and telephone lines over the roadway;
- the location of power poles from which service may be obtained;
- if traffic signals are present or proposed, the location of the power pole and control cabinet;

- the location of all poles and luminaries;
- electrical distribution and control system designs, include wiring diagrams (e.g., control circuit diagram); and
- drawings of equipment, foundations, and electrical details;
- type of pavement;
- indicate either residential or commercial;
- all conduit and cable runs, including the size of the cable and conduit at each location; and
- the calculated footcandles at the pavement surface.

10. Structure Plans. Structural plans should follow the requirements in the *BBS Bridge Manual*. Include the county engineer's certification and professional engineer seal or structural engineer's seal as appropriate.

11. Cross Sections. The following information should be included on the cross sections:

- Provide the proposed centerline pavement surface elevation on each cross section.
- Label the side slope on the first and last cross section of each sheet and where there are changes in the slope. Show the side slope using a vertical to horizontal ratio (e.g., 1V:3H).
- Show the cut and fill areas, in square feet (square meters), above or beside each cross section.
- Provide a full section for each crossing culvert pipe with elevations.
- Include guardrail requirement, where applicable.

12. *Highway Standards*. See Section 11-4 for a discussion on *IDOT's Highway Standards*.

11-1.03(b) Utility Plans

Utility Plans should include the following details:

- the type and nature of all existing utility facilities (e.g., mains and services) located within the limits of the right-of-way;
- all owners and their addresses;
- existing and proposed right-of-way lines;
- any temporary adjustments;
- the location of the final utility facility and cross sections for all buried utilities; and

- the sequence and schedule of adjustments, relative to other construction activities.

11-1.03(c) Railroad Plans

Include the following information to the railroad plans:

1. At-Grade Crossings. For at-grade crossings, include the following:

    - the number of mainline and subsidiary tracks,
    - the type and width of crossing,
    - the angle of crossing,
    - the general condition of the existing crossing,
    - the existing and proposed warning devices,
    - the number and speeds of passenger and freight trains,
    - the anticipated construction date,
    - the current highway ADT for existing crossing,
    - the 10 year projected highway ADT for proposed crossing,
    - the type of proposed rail to be used in the project,
    - the distance between existing and proposed crossings, and
    - any abandoned crossing.

2. Grade Separations. For grade separations, include the following:

    - the vertical clearance between the highway or railroad rails and bottom of the superstructure;
    - a plan and profile of the track and of the proposed highway improvement for 500 ft (150 m) each way from the intersection of the highway and railroad centerlines;
    - the flow line and cross section of existing and proposed drainage structures involved;
    - typical highway and track cross sections;
    - all railroad and highway right-of-way lines;
    - the distance to a railroad Mile Post;
    - the location and height of wire lines on the railroad right-of-way;
    - all details for any track adjustments or runaround tracks proposed;
    - detour road-crossing details and proposed temporary warning devices, including a plat and description of temporary easement, if required;

- detailed plans of the structure; and
- all other construction data pertinent to the project.

11-1.03(d) Right-of-Way Plans

See the *IDOT Bureau of Land Acquisition Manual* for information concerning the preparation of Right-of-Way Plans.

11-1.04 Drafting Guidelines

Project drafting is typically performed using CADD. The *IDOT CADD Roadway Drafting Reference Guide* (CADD Guide) provides information on the use of CADD. However, manual drafting is still being used on some projects, especially small, simple projects. Section 63-3 of the *BDE Manual* provides general information on the drafting criteria for preparing plans, including:

- dimensioning guidelines for plan sheets;
- guidelines for using abbreviations;
- use of symbols on the plan sheets and cell libraries;
- guidelines for capitalization (i.e., use upper case for all text shown in the plans);
- stationing guidelines;
- guidelines for showing superelevation rates, grades, angles, etc., on the plans;
- guidelines for sheet numbering;
- recommended drawing scales;
- sheets sizes;
- sheet organization; and
- data plotting (CADD or manual drafting).

11-2 PLAN REVIEW

11-2.01 Preliminary Plan Review

11-2.01(a) General Review

The purpose of the preliminary plan review is to ensure the plans are in conformance with the design criteria presented in this *Manual* and other IDOT documents and is appropriate for the site. The preliminary plan review will occur after the designer has essentially completed the plans including the cover sheet, plan and profile sheets, detail sheets, cross section sheets, determination of pay items, special provisions, etc. During this stage, the designer should address any utility conflicts and determine if adjustments and/or agreements are necessary. This also may include a plan-in-hand field review, if deemed necessary. This is the best design stage for IDOT and other agencies that may have a role in the project to conduct a major review of the plans. All major content comments must be made during this review period. All plan commitments of record should be incorporated into the preliminary plans. IDOT and agencies that have made commitments on the project should review the preliminary plans to ensure that the plans comply with their commitments.

For major projects, more than one plan review may be necessary to avoid having to make substantial changes late in the plan preparation process.

11-2.01(b) Bridge Plans

The Local Bridge Unit within the Bureau of Bridges and Structures (BBS) will be responsible for advising, reviewing, and/or approval of the local agency bridge plans.

For certified bridge/box culvert plans, a preliminarily review is not required. For complex and unusual designs, a preliminary submittal should be made for review. The stage in the plan development for this review should be determined after the review of the PBDHR. For more complex projects, additional reviews may be necessary. Contact the Local Bridge Unit of the BBS to discuss the need for preliminary reviews.

11-2.01(c) Lighting Projects

The local agency is required to submit plans and specifications that involve lighting improvements along a State highway to the district, except in Region 1, District 1. The district will then forward the plans and specifications to the Central BLRS for review by the BDE. Projects that involve lighting along non-State highways will be sent to the BDE for their review when the P, S, & E is submitted the Central BLRS for letting

11-2.01(d) Traffic Signal Plans

The local agency is required to submit plans and specifications that involve traffic signal improvements at intersections with State highways, except in Region 1 District 1. The district will then forward the plans and specifications to the Central BLRS for review by the Central Bureau of Operations. Projects that involve traffic signal improvements at intersections with non-State highways will be sent for review by the Central Bureau of Operations when the P, S, & E is submitted to the Central BLRS for letting. The Central Bureau of Operations will review the plans and specifications for compliance with the ILMUTCD and IDOT traffic signal requirements.

11-2.02 Pre-final Plan Review

Pre-final plans are essentially the same as the final plans. If there are only minor review comments on the preliminary plans, these plans can then be finalized and forwarded to the district for approval before the project is scheduled for letting. Prior to this review, the designer should incorporate and/or address all comments made during the preliminary plan review.

The district will review the pre-final plans to ensure that:

- their comments from the preliminary plan review have been incorporated into the plans or addressed satisfactorily in the transmittal correspondence,
- the changes from the preliminary plans do not conflict with any commitments, and
- the plans still conform to the design criteria.

11-2.03 Final Plan Review

The purpose of the final plan review is to ensure that reviewer comments from the pre-final plan review have been addressed. Revisions or changes should not be necessary.

11-3 SPECIFICATIONS AND SPECIAL PROVISIONS

11-3.01 General

The IDOT publications *Standard Specifications for Road and Bridge Construction (IDOT Standard Specifications)*, the *Supplemental Specifications and Recurring Special Provisions*, contract special provisions, and plans all are essential parts of the contract. They should complement each other and provide complete instructions for the work to be accomplished. If a discrepancy exists among these documents, the relationships as described in the *IDOT Standard Specifications* will apply.

11-3.02 Specifications

11-3.02(a) *IDOT Standard Specifications*

The *IDOT Standard Specifications* outline the general requirements and covenants applicable to all highway construction improvements as well as provisions relating to materials, equipment, and construction requirements for individual items of work on road and bridge construction projects awarded by IDOT. The *IDOT Standard Specifications* are intended for general and repetitive use. They provide IDOT criteria for:

- the scope of work,
- control of work,
- control of materials,
- legal regulations and responsibilities to the public,
- contract execution and progress, and
- measurement and payment of contract items.

The *IDOT Standard Specifications* are published in book form and are updated every 3 to 4 years. They are approved by the Specifications Committee, which acts in an advisory capacity to the Director of Highways. The Specifications Committee includes permanent representatives from the Bureaus of Bridges and Structures, Design and Environment, Construction, Materials and Physical Research, Operations, Local Roads and Streets, District One, FHWA, and the Illinois State Toll Highway Authority. The other eight downstate districts hold three seats on a 3-year rotating basis. The Director of Highways chooses the chairperson for a 4-year term. The Standards and Specifications Engineer in the Bureau of Design and Environment is the recording secretary.

Suggested changes to the *IDOT Standard Specifications* initiated by local highway authorities or the district should be submitted to the Central BLRS Policy and Procedures Unit for consideration by the Specification Committee.

Use of the *IDOT Standard Specifications* is required for local agency projects administered by IDOT. They may also be used for other local agency projects and private work.

11-3.02(b) Supplemental Specifications

Supplemental Specifications are additions, deletions, and/or revisions to the *IDOT Standard Specifications* that have been adopted by IDOT since the last printing of the *IDOT Standard Specifications*. They require the approval of the Specification Committee. They are automatically considered part of the *IDOT Standard Specifications*. Supplemental Specifications are contained in the *Supplemental Specifications and Recurring Special Provisions* that is revised and printed in book form each year.

11-3.03 Special Provisions

11-3.03(a) General

Special provisions are additions or revisions to the *IDOT Standard Specifications* documenting conditions and requirements for special situations. A special provision should not modify another special provision.

11-3.03(b) Recurring Special Provisions

Recurring Special Provisions are special provisions that are commonly used on many projects. Unlike the *IDOT Standard Specifications* and the Supplemental Specifications, Recurring Special Provisions do not require the approval of the Specifications Committee. Recurring Special Provisions are printed annually in the *Supplemental Specifications and Recurring Special Provisions* and are included in a bidding document and contract by referencing their applicability through the use of a check sheet. The designer is responsible for checking the appropriate Recurring Special Provisions for the project and including the check sheet with the bidding documents.

11-3.03(c) Contract Special Provisions

Contract Special Provisions are the special provisions that the designer includes with the proposal that is submitted with the plans to the district. They may include one or more of the following:

1. Bureau of Design and Environment Special Provisions (BDESPs). These special provisions are contract special provisions issued quarterly by BDE for Statewide use. They are issued through BDE effective beginning with a specific letting. The Central BLRS reviews a list of BDESPs and the usage guide semi-annually to local agencies and consultants. The full packet is available for download from IDOT's website. The

designer is responsible for including the appropriate BDESPs into the proposal for each project.

Figure 11-3A presents the procedure for distributing special provisions from BDE to the Central BLRS.

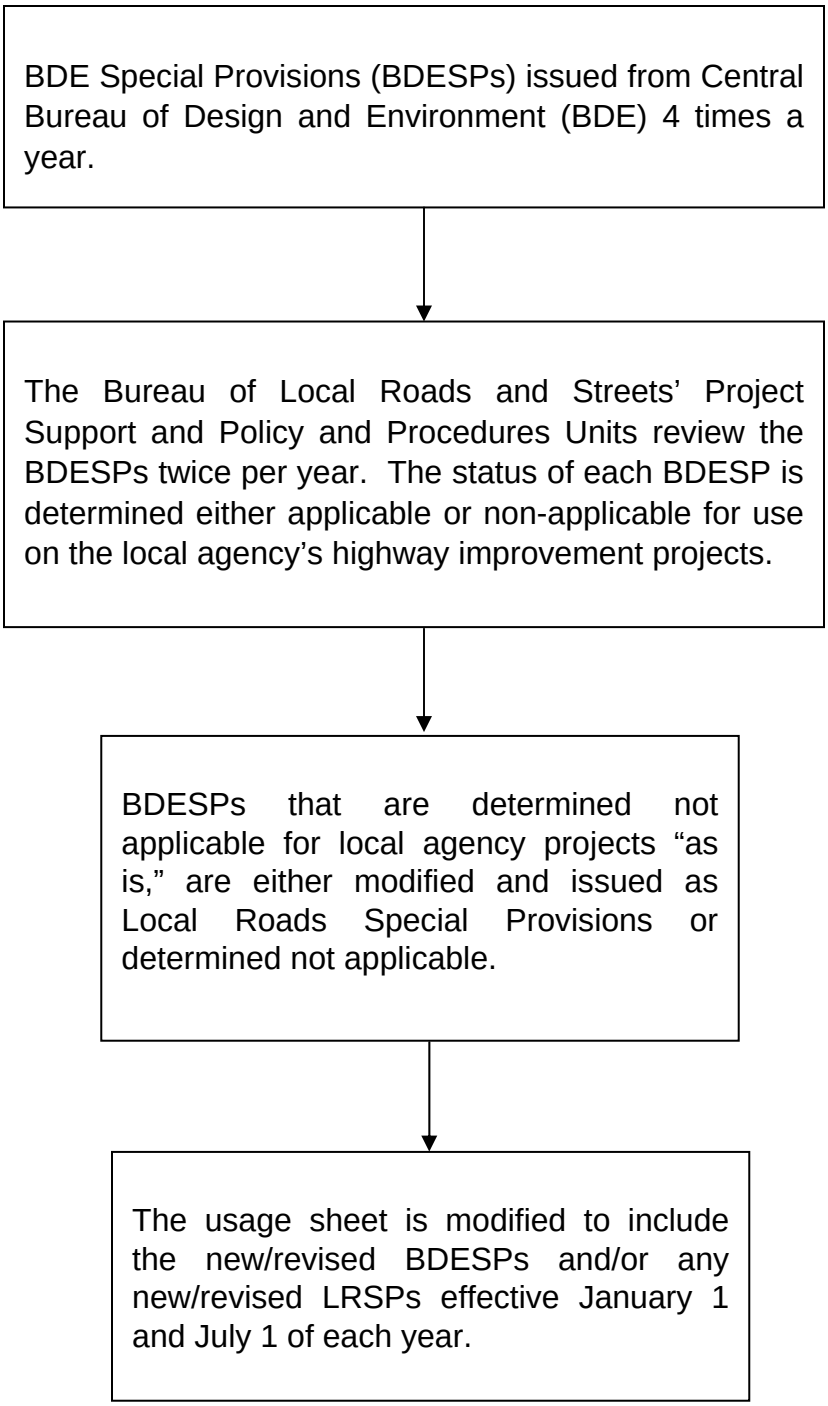
2. Guide Bridge Special Provisions (GBSPs). Guide Bridge Special Provisions are contract special provisions issued by the Bureau of Bridges and Structures that may have changes from letting to letting. The designer is responsible for including the appropriate GBSPs into the proposal for each project. These special provisions are available on the IDOT website.

3. Local Roads Special Provisions (LRs). Local Roads Special Provisions are contract special provisions issued for Statewide local agency use. These special provisions are written to cover the needs of local agencies when they differ from those of the State and are designated with an "LR" followed by a number which references the section of the *IDOT Standard Specifications* that the LR Special Provision revises (e.g., LR 302 revises Section 302 of the *IDOT Standard Specifications*)). LR Special Provisions are available for downloading from the IDOT website. The designer is responsible for including the appropriate LR Special Provisions into the proposal for each project.

4. District Special Provisions. District Special Provisions are contract special provisions addressing concerns unique to a district (e.g., material shortages, labor agreements). Prior to general insertion into contract proposals, the district approves these special provisions. They may be obtained from the district office. The designer is responsible for including the appropriate District Special Provisions into the proposal for each project. The district may also recommend these special provisions for consideration as BDE Special Provisions or Local Roads Special Provisions.

5. Project Specific Special Provisions. Project specific special provisions are contract special provisions written by the designer to address a unique situation on a project. These special provisions should not be used in more than one project. Project specific special provisions are required wherever a project contains work, material, unique sequence of operations, or any other requirements that are necessary for the completion of the project but are not included in the *IDOT Standard Specifications*, *Supplemental Specifications* and Recurring Special Provisions, BDE Special Provisions, Guide Bridge Special Provisions, Local Roads Special Provisions, or District Special Provisions. These special provisions should not be prepared to personalize the work to the ideas of the designer or to place emphasis on certain aspects of a project. The practice of emphasizing particular procedures and requirements already stated in the *IDOT Standard Specifications* is more properly accomplished at the preconstruction conference. The designer is responsible for writing and including the appropriate Project Specific Special Provisions into the proposal for each project.

   The district may consider these special provisions for District Special Provisions or recommend them for LR Special Provisions or BDE Special Provisions.



DISTRIBUTION OF SPECIAL PROVISIONS

Figure 11-3A

The *IDOT Standard Specifications* and Supplemental Specifications are included in the contract documents by referencing the applicable editions in the first paragraph of the special provision portion of the bidding document and contract. Recurring Special Provisions are included through the use of a check sheet. Contract Special Provisions are included in the documents provided to the contractor.

11-3.04 Special Provisions Preparation

11-3.04(a) Preparation Steps

The designer should use the following steps when preparing a special provision:

1. Determine Need. The designer should review the existing specifications, standards, details, special provisions, and plans to ensure that there is a need for the special provision. If the topic is not adequately covered in one of the other documents, only then should a special provision be prepared. The purpose of the special provision should be clear. Some examples are:

   - changes or clarifications to the general requirements or covenants of the construction contract,
   - changes or clarifications to the material or equipment requirement,
   - changes or clarifications to a construction procedure,
   - establishing or modifying a pay item, and/or
   - describing a new or experimental procedure or product.

   If an existing standard specification includes the information necessary for a project, but is not clear, do not rewrite the specification into a special provision. Send a detailed recommendation to the district for clarification. Additionally, if it is required to only revise or add new information to an existing standard specification, do not rewrite it. Use one of the following suggestions in wording this type of special provision:

   - "Work shall be in accordance to Section _____except for _____" or
   - "Revise the second sentence of Article _____ to read _____".

2. Research. The designer should research the topic so that complete and detailed information is available before writing the special provision. If the designer determines this special provision will be applicable in more than one project, submit the special provision to the district and/or Central BLRS for consideration as a District Special Provision, Local Roads Special Provision, or Inserted Special Provision.

3. Format. Prepare special provisions in the same manner as the *IDOT Standard Specifications*. Section 11-3.04(b) presents the format that should be used.

4. Writing the Special Provision. Once all the research has been completed, the first draft can then be prepared. The designer may want to review existing special provisions for guidance. The following are several grammatical recommendations for preparing special provisions:

   a. Wording. Write in the passive voice.

   b. Sentences. Prepare the special provision using simple language and words. Keep words and sentences short (i.e., 20 words or less), unless complexity is unavoidable.

   c. Paragraphs. Limit paragraphs to three or four sentences.

   d. Terminology. Words used should be consistent with their exact meaning. Use the same word throughout; do not use synonyms. Avoid any words that have a dual meaning. Section 11-3.04(d) presents the recommended terminology that should be used. Omit the use of extraneous words and phrases.

   e. Pronouns. Avoid the use of pronouns, even if this results in frequent repetition of nouns.

   f. Punctuation. Carefully consider the punctuation using the minimum number of punctuation marks consistent with the precise meaning of the language. Ensure that the meaning of any sentence is not in doubt.

   g. Parentheses. Avoid the use of parentheses ( ). Instead, use commas or rewrite the sentence.

   h. Numbers. It is unnecessary to write numbers both in words and figures. Write all numbers associated with abbreviated units numerically (e.g., 2 m, 8 mph, 32 kPa). Write fractions as decimals. Decimals less than one and greater than –1 should be preceded by a zero. Numbers within charts and tables are always written as numbers.

      For numbers not associated with an abbreviated unit, use the following:

      - numbers from zero to ten will be spelled out (e.g., ten hours, two-way radio, seven tires);
      - numbers greater than ten will always be written as numbers (e.g., 12 hours, 50 cycles, 11 percent); and
      - numbers less than one will be written as decimal numbers except inches will be written as fractions (e.g., 0.2 acre, 300 mm, 3/4 in).

i. Dates and Times. Use numbers for time, day, and year. Use the full name of the month.

5. Reviewing. The designer should review the previously completed paragraphs as succeeding ones develop. Where necessary, redraft preceding paragraphs to reflect later thoughts.

6. Submissions. The designer should prepare and distribute the preliminary draft of the special provisions to the district for review and comment as soon as practical. The designer will be responsible for incorporating the reviewers' comments into the final draft.

11-3.04(b) Format

Prepare special provisions in the same format as the *IDOT Standard Specifications*. The sections of the special provision that should be addressed, when needed, include:

1. Description. Provide a brief narration of the work to be performed with references to specifications, plans, or other special provisions that further define the work. The description usually begins with "This work shall consist of…" Only mention the major aspects of the work.

2. Materials. Designate the materials to be used in the work and establish their requirements. Delineate complete specifications of the properties of each material and the test method. References may be made to AASHTO, ASTM, or other recognized standards/procedures. Where a material is already specified in the *IDOT Standard Specifications*, reference the appropriate article or section with any necessary changes stated. Do not reproduce a standard specification in its entirety to revise one or two elements.

   The use of proprietary specifications is generally prohibited by the *Illinois Compiled Statutes*. However, the Statutes do allow, under certain conditions, proprietary items to be used. Where the designer has a need for a proprietary specification, see Section 11-3.05(d) or contact the district for guidance.

3. Equipment. Designate the equipment to be used in the work and establish its requirements. Where a piece of equipment is already specified in the *IDOT Standard Specifications*, reference the appropriate article or section with any necessary changes stated. Do not reproduce a standard specification in its entirety to revise one or two requirements.

4. Construction Requirements. Describe the sequence of construction operations or the desired end product. Only use the presentation for the sequence of construction operations if it is critical to achieve the desired result.

5. Method of Measurement. Describe the units of measurement for each pay item and where the item will be measured (e.g., in place, in truck, at plant). Designate any modifying factors and other requirements needed to establish a definite measured unit.

6. Basis of Payment. Describe the units and the pay item name for which payment will be made. Note the entire pay item name in upper-case letters. Do not include a listing of all elements of the work.

11-3.04(c) Guidelines

In addition to the above sections, the following presents several guidelines the designer should consider when developing special provisions:

3. Completeness. The designer should ensure that the essentials have been included, each requirement is definitive and complete, and the *IDOT Standard Specifications* have not been duplicated. The special provision should not be vague.

4. Clarity. To ensure clarity, the designer should:

- clearly delineate the method of measurement and basis of payment;
- make a clear, concise analysis of the job requirements for general conditions, types of construction, and quality of workmanship. Do not leave the contractor in doubt on what they will be required to do;
- give directions, never suggestions;
- never assume the contractor knows what is meant;
- avoid conflicting or ambiguous requirements. Every specification should have only one meaning; and
- never conceal difficulties or hazards from the contractor. This avoids conflict during the project.

5. Conciseness. Each special provision should be as concise as practical. When reviewing the special provision, the designer should consider the following suggestions:

- where practical, refer to an existing specification and delineate only the portion changed;
- avoid duplications between different special provisions and any related contract documents;
- do not give reasons for a specification requirement;
- do not provide additional information that is unnecessary for the preparation of bids and the accomplishment of the work;
- once stated, do not repeat any instruction, requirement, direction, or information;

- use cross-references, wherever practical;
- write the specification in the positive form (e.g., use “will” instead of “will not”); and
- do not include instructions to the local agency or IDOT in the specification.

6. Correctness. To ensure that the special provision is written correctly, the designer should review the following:

- do not include items that cannot be required or enforced;
- ensure that the specification does not punish the contractor or supplier;
- ensure that the specification does not unintentionally exclude an acceptable product, construction method, or any equipment;
- ensure that the provision does not change the basic design of the item;
- minimize the inclusion of work incidental to a pay item;
- do not specify impossibilities (The practical limits of workers and materials must be known and recognized);
- specify standard sizes and patterns wherever practical;
- use best available technology;
- ensure that the contractor will not be held responsible for the possible inaccuracy of information furnished by the local agency and/or IDOT;
- ensure sufficient attention has been provided to assessing the durability or reliability of the material or procedure discussed. The use of recognized standards should be referenced to ensure that the specified performance or characteristics are achieved. If not, define the testing criteria completely and accurately;
- make a careful, critical examination of manufacturers’ or trade associations’ recommendations and require supporting evidence;
- requirements should be stringent (A strong requirement can be relaxed more economically, when the need arises. Weak specifications cannot be strengthened without increasing cost and generating claims);
- ensure that the provision gives directions that are consistent with the standard practice currently used by IDOT or the local agency; and
- ensure that the special provision only modifies the *IDOT Standard Specifications* and not other special provisions.

11-3.04(d) Terminology

Phraseology and terminology used in the *IDOT Standard Specifications* also should be used in the special provisions. In addition, the designer should consider the following:

1. Abbreviations. Generally, avoid abbreviations. However, they may be used if they are defined and the definitions are consistent with the accepted meanings. Always use the abbreviations for the terms listed in the *IDOT Standard Specifications*.

2. Amount, quantity. Use "amount" when writing about money only. When writing about measures of volume, use "quantity."

3. Any, all. The word "any" implies a choice and may cause confusion. In place of "any," the term "all" should be used.

4. Article. Capitalize "Article" when referring to an article of the *IDOT Standard Specifications*.

5. As per. Do not use "as per"; instead, use "according to."

6. As shown on the plans. Use "as shown on the plans" instead of "as shown in the plans," "as detailed on the plans," "as shown on the detail sheets," "as shown on the highway standards," or "as shown on sheet *(number)* of the plans."

7. Contractor. Use the word "Contractor" in place of the word "bidder" when writing special provisions for construction. "Bidder" should only be used for proposals. Contractor should always be capitalized.

8. Course. Use "course" for layers, not for "lifts."

9. Day. Define the type of day to be used (e.g., calendar day, working day).

10. Department. Use "Department" in place of "Illinois Department of Transportation." Department should always be capitalized. Do not use the IDOT acronym in the contract documents.

11. Included In. Use "included in the cost" instead of "incidental to." The price of all work will be factored somewhere into the contract. Bid prices are generally lower when the contractor knows where to include costs.

12. Pay Item. Use "pay item" instead of "bid item."

13. Proposal. Do not use the word "proposal" when the word "contract" is intended. The term "proposal" only should be used to describe requirements during the bidding process.

14. Said. Do not use "said pipe," "said aggregates" but, instead, use "the pipe," "the specified aggregates."

15. Same. Do not use "same" to replace a pronoun like "it" or "them" standing alone, such as "connected to same," "specified for same," or "same will be given consideration." The sentence should be rewritten to clearly describe what is meant.

16. Section. Capitalize "Section" when referring to a section in the *IDOT Standard Specifications*.

17. Shall, will. Use the word "shall" when specifying the responsibilities of the contractor. Use the word "will" when specifying the responsibilities of IDOT ("we will," "they shall").

18. State. The term "State" is preferred over the "State of Illinois" or "Illinois."

19. Such. Do not end a sentence with the word "such." "Such" usually means "of this or that kind," or similar to something stated. Instead, state that which is actually meant, or name the work to be completed or rephrase the sentence.

20. The. Do not eliminate "the" for brevity.

21. Unless Otherwise Specified. Do not use the term "unless otherwise specified." In special provisions, the designer should know if something will be "otherwise specified." In the *IDOT Standard Specifications* everything can be "otherwise specified" in the plans or through Contract Special Provisions.

22. Unit Price. Use "contract unit price" instead of "contract unit price bid."

11-3.04(e) Unit Abbreviations

The *IDOT Standard Specifications* and the Supplemental Specifications provides a list of unit abbreviations adopted for the *Standard Specifications* and the *Supplement Specifications and Recurring Special Provisions*.

11-3.05 Specifying Materials

11-3.05(a) Specifying Aggregates for Surfaces and Bases

The local agency may specify in a special provision a surface or base course that provides for the use of either crushed or uncrushed aggregate. It is permissible to also allow local materials in addition to the materials specified in the *IDOT Standard Specifications* for a particular surface or base.

11-3.05(b) Specifying Seal Coat or Blotter Aggregate

Special provisions for seal coats and blotter treatments may provide for a specific type of aggregate (e.g., gravel, crushed stone). Either material, or one material to the exclusion of the

other, may be specified. If one material will be specified to the exclusion of the other, provide a special provision to define the type and gradation of the desired aggregate material. It is permissible to allow an approved local gradation in addition to those specified in the *IDOT Standard Specifications* for a particular surface treatment.

11-3.05(c) Specifying Bituminous Materials

It is permissible, where the *IDOT Standard Specifications* permits the use of two or more types of bituminous materials, to specify one type to the exclusion of the others, or separate bids may be taken on two or more types. In the latter case, the special provision may specify that the awarding agency reserves the right to make the award to the lowest responsible bidder for any type.

11-3.05(d) Patented or Proprietary Items

Proprietary items may be included in a contract if:

- standard items are also included and the contractor has the option to select either the standard or the proprietary method of construction or maintenance (605 ILCS 5/9-110), or
- where they are essential to ensure compatibility with an existing system.

Document the reason for specifying the product in the project files. Acceptable patented and/or proprietary items can be found on IDOT's website.

11-3.05(e) Guaranty/Warranty Clauses

Except as noted below, guaranty or warranty clauses that require the contractor to guarantee or warrant materials and workmanship will not be approved. This restriction is not intended to prevent local agencies from benefiting under any guaranty or warranty given as a customary trade practice for any material or product purchased. Exceptions to this restriction are as follows:

7. Electrical or Mechanical Equipment. Contracts that involve furnishing and/or installing electrical or mechanical equipment may include contract clauses that require:

    - Manufacturers' warranties or guarantees on all electrical and mechanical equipment, consistent with those provided as customary practice.
    - Contractors' warranties or guarantees providing for satisfactory in-service operation of the electrical and mechanical equipment and related components for a period not to exceed 6 months following project acceptance.

8. Separate Non-Participating Pay Items. Guaranty/warranty clauses that are incorporated into the contract as separate non-participating pay items.

11-3.06 Experimental Projects or Features

An experimental feature may be a material, equipment item, process, method, traffic operational device, or other feature that has not been sufficiently tested under actual conditions to merit acceptance without reservation in normal highway construction or which has been accepted, but needs to be compared with alternative acceptable features to determine relative merits and cost effectiveness. The *Products Evaluation Circular*, which is a useful document for determining the status of new product proposals in Illinois, can be found on IDOT's website.

For an experimental feature to be authorized or approved for inclusion in a project, an Experimental Features Work Plan must be prepared for approval by the Bureau of Materials and Physical Research (BMPR). The work plan must be prepared and submitted through the district, prior to submission of the PS&E. This work plan should contain or reflect the following items:

- A project location map.
- The experimental feature and the method of construction, as well as the materials, process, technique, and/or equipment necessary that is a departure from normal procedures.
- The objective of the experiment in terms of the purpose, how the results might be used, and the benefits (e.g., savings in time, money, and lives).
- A suggested evaluation process including the frequency of inspection. A control section should be provided unless the nature of the experiment is such that a control section would serve no purpose.
- The estimated difference in cost. Note that higher costs are normally anticipated; however, the experimental feature should not be excluded for this reason.
- Plan drawings and any special provisions pertaining to the experimental feature that would be beneficial.
- The estimated time or duration necessary for evaluation.
- Reference to any research on the subject.

Upon receipt of the work plan, the district will forward the work plan with a recommended action to the Central BLRS. Upon receipt by the Central BLRS, the appropriate Project Development Engineer will review the proposal. After perusal, the proposal will be discussed with the Bureau of Materials and Physical Research (BMPR). If BMPR accepts the project, the Project Development Engineer will inform the district of approval by memorandum. The district will notify the local agency of the approval.

If BMRP recommends the project but does not have the manpower to evaluate it, the project may still be approved if the local agency, the district, or some other acceptable party agrees to evaluate the project and maintain the records. If approved in this manner, the Project Development Engineer will notify the district by memorandum as detailed above. The local agency will be responsible for submitting annual and final reports to the BMPR through the district. Assistance in the preparation of work plans, evaluation records, and final reports is available from the Central BLRS Policy and Procedures Unit.

11-4 HIGHWAY STANDARDS

The *IDOT Highways Standards* are developed by the Bureau of Design and Environment (BDE) in collaboration with other bureaus and are approved by BDE for general use. Districts and local agencies may submit ideas and details for the *IDOT Highways Standards* to BDE.

The *IDOT Highways Standards* provide details on various design elements that are consistent from project-to-project. They provide information on how to construct the various design elements. Design data and/or specifications are not included on the highways standards. The designer is responsible for providing a copy of the standard in the proposal for local-let projects.

11-5 QUANTITY ESTIMATES

In addition to preparing clear and concise plans, as described in Section 11-1, the designer needs to compile an accurate summary of the project quantities. This information leads directly to the Engineer's Estimate, which combines the computed quantities of work and the estimated unit bid prices. An accurate summary of quantities is critical to prospective contractors interested in submitting a bid on the project. Chapter 64 of the *BDE Manual* presents guidelines on calculating quantities for highway construction projects.

11-5.01 Guidelines for Preparing Quantity Computations

When preparing quantity computations, the designer should consider the following guidelines:

1. Specifications. Cross check all items against *the IDOT Standard Specifications* and the *Supplemental Specifications and Recurring Special Provisions* to ensure that the appropriate pay items, methods of measurement, and basis of payment are used. If an item is not covered in the *IDOT Standard Specifications* or *Supplemental Specifications and Recurring Special Provisions*, a special provision, plan note, or detail must be included in the contract documents to cover the item. Only the official name and description should be used in the contract documents, special provisions, and summary of quantities.

2. Rounding. The quantity of any item provided in the plans should check exactly with the figure on the computation sheets. Indicate any rounding of the raw estimated figures on the computation sheets. Unless stated otherwise, no rounding of the calculations should be done until the value is incorporated into the summary of quantities sheet.

3. Significant Digits. When calculating quantities, carefully consider the implied correspondence between the accuracy of the data and the given number of digits.

4. Cost Estimate. Only use the total values from the summary of quantities sheets to develop the cost estimate. Show all items described in the plans that will be included in the cost estimate on the plan sheets. Section 11-6 provides the criteria for preparing construction cost estimates. These quantities are used to determine the final Engineer's Estimate.

5. Estimating Forms/Computation Worksheets. Blank copies of the estimating forms and computation worksheets are available from BDE.

11-5.02 Computer Estimates

For most projects, the computer can be used to develop some of the quantity estimates. For small projects, it may be more efficient to manually calculate the quantities for all elements, including earthwork. Each software package (e.g., GEOPAK) uses different procedures for

determining how and which quantities can be estimated. The designer should give special consideration to how the plans are prepared on the computer (e.g., cell names, levels, processing procedures) to allow the software to determine the quantities.

11-5.03 Computation Records

In preparing the project quantities, prepare computation sheets for each item used on the project. Combine these sheets and bind them with a cover sheet. The preparer should sign or initial and date each sheet. The checker should also sign or initial and date each sheet. Number the sheets and indicate the total number of pages on each sheet (i.e., Sheet x of y).

Check all values obtained through computations or use of standardized tables, preferably on an independent basis. For those pay items where agreements may be reached to make payment on the basis of planned quantities, an independent check should be performed and noted. Note the resolution of any differences between original and check computations. Where the computer performs computations, an independent check is not required. However, make spot checks of the input and review the computation output sheet for obvious mistakes. Also, sign and date the computer output similarly to hand computation sheets.

Retain the quantity computations within the project file.

11-5.04 Units of Measurement

Estimate the quantities for all contract bid items using the terms and units of measurement presented in the *IDOT Standard Specifications*. Show the values determined from the computations on the summary of quantities sheet, and elsewhere in the plans. Section 64-1 of the *BDE Manual* illustrates typical rounding criteria that should be used on the summary of quantities sheet and in the plans. Note that certain elements are rounded based on standard manufacturer sizes.

11-5.05 Construction Time Estimates

Exercise care when estimating the contract time. Contract time, working days, and calendar days are defined in the *IDOT Standard Specifications*. Unreasonable time limitations will unnecessarily increase bid prices and the potential for claims, which is especially important if the proposal includes provisions for liquidated damages. The procedures and factors to consider when estimating the contract time are discussed in Section 66-2 of the *BDE Manual*.

11-5.06 Non-Defined Work

11-5.06(a) Lump-Sum Items

Only use lump-sum bid items where the scope of work for the item is clearly defined, and the amount of work has a minimal chance of changing during construction. The *IDOT Standard Specifications* defines which quantities may be estimated as lump sum. Wherever practical, list the quantities for the separate items that will be included within the lump-sum item. The list should note that the separate "quantities are for estimating purposes only." Where there is a significant chance of quantity changes, the work must be bid by the unit and not lump sum. Where lump-sum items are used, the total quantity for the project will always equal one.

11-5.06(b) Items Included in Other Work

No item should be shown as incidental to another pay item or the contract. If any item will be included as part of another item, it must be addressed by the specifications or with a special provision. The designer should only include an item of work in another pay item where the scope of work for both is clearly defined and the probability of the quantity of either item changing is minimal. In general, minimize the use of items included in other pay items. It is difficult for bidders to prepare an accurate estimate for a project that contains incidental items for which quantities or the scope of work is indeterminable.

In general, use the applicable pay item for those items that are normally covered in the *IDOT Standard Specifications*. Where the quantities or scope of work items are indeterminate at the time of bidding, these items should be paid for on a force account basis as described in the *IDOT Standard Specifications*.

11-6 COST ESTIMATES

An estimate is the predicted project cost at the time of receipt of bids developed from a knowledge of cost of labor, materials, equipment, overhead, profit, and incidental items. The following apply to local-let projects. For additional guidance on cost estimates, see Chapter 65 of the *BDE Manual*.

11-6.01 Project Estimates

A local agency is required to submit a project cost estimate for all work administered by IDOT. Estimators should evaluate the following:

1. Labor Costs. Labor costs are variable throughout the State. The estimator must determine not only what types of crafts, but also the most efficient number of workers in each craft that will be required to complete construction of the improvement. In addition, the estimator must take into consideration the efficiency of the local labor, their working agreement, welfare and fringe benefits, guarantees of minimum working hours per week, show-up time clauses, and non-working conditions due to mechanical breakdowns or bad weather in determining a unit cost for labor. Social security, compensation, and liability insurance costs must also be added to the labor costs as it pertains to the items involved.

2. Material Costs. Material prices should be obtained from area suppliers. Note that these prices are probably higher than those obtainable by a contractor. Therefore, the estimator should use judgment based on past experience.

3. Equipment Costs. Equipment costs include:

   - ownership expense for depreciation;
   - repairs;
   - taxes; and
   - storage, when equipment is idle.

   Operating expenses are kept separate and include fuel, oil, and grease.

4. Overhead Costs. Overhead costs may include bonds, moving equipment, incidental materials, general supervision, and field cost accounting.

5. Profit. Profit may range from 10% (over $100,000) to 20% ($5,000 or less).

6. Incidental Costs. Incidental costs may occur for:

   - work that is incidental to the contract,

- stage construction,
- tight completion dates,
- excessive hand work, and
- congested work area.

11-6.02 Estimating Forms

Form BLR 11510 is available from each district for use by local agencies in preparing cost estimates for construction projects.

11-7 PLANS, SPECIFICATIONS, AND ESTIMATES (PS&E) PROCESSING

11-7.01 PS&E Submittal

The local agency will submit the PS&E for all improvements, including traffic signal and illumination improvements, to the district for review and approval. All highway plans must be sealed by an Illinois licensed professional engineer, which includes the licensee's written signature, date of signing, and expiration date of the license. The plans must also be signed by an appropriate local agency official.

11-7.02 Bond Issue and Special Assessment Improvements

A local agency may propose a bond issue or special assessment improvement with the intention of either using MFT funds in conjunction with or, at a later time, requesting the expenditure of MFT funds to retire the bonds or the public benefit assessment portion of the improvement. Submit the PS&E for these projects in the same manner as required for typical MFT projects. For special assessment work, submit the PS&E to the district for approval before initiating the court proceedings.

11-7.03 Approval of Bridge Plans

Bridge plans that are included in the PS&E will be approved as follows:

1. Structural Engineer's Seal, Signature, and Certification. The following applies to the requirements for a structural engineer's seal, signature, and certification:

    a. Plans Prepared by a Structural Engineer. For plans prepared by an Illinois licensed structural engineer, the seal of the structural engineer responsible for the design must be affixed to the plans. The plans must include the licensee's written signature, date of signing, and expiration date of the license. The seal of a licensed professional engineer is not an acceptable substitute to the structural engineer's seal.

    b. Plans Prepared by the County Engineer (Non-Standard). The Engineer of Bridges and Structures will seal structure plans for counties, provided that a county engineer, who is an Illinois licensed professional engineer, has prepared the plans. Sufficient time must be allowed for the review by the Bureau of Bridges and Structures (BBS). The county engineer will place the following statement on the General Plan and Elevation Sheet of the structure plans:

These plans were prepared by me or by a full-time member of my staff working under my personal supervision.

(P.E. Seal) Date: _____

Date of License
Expiration: _____

County Engineer
Illinois Licensed Professional Engineer #

If the design is found to be structurally adequate, the structural engineer's seal of the Engineer of Bridges and Structures will then be affixed to the plans.

c. Certified Bridge/Box Culvert Plans. Local agency simple span bridges, continuous span bridges, and multiple box culverts are considered structurally adequate by IDOT when the plans are appropriately certified by an Illinois licensed structural engineer. These certified structures should follow the design, standard details, and guidelines shown in the *IDOT Bridge Manual* and other Manuals maintained by the Bureau of Bridges and Structures. Review by BBS for structural adequacy and economical design will still be required for structures of unusual or complicated design.

Place the following certification on the first sheet of the bridge plans:

> I certify that to the best of knowledge, information and belief, this bridge/box culvert design is structurally adequate for the design loading shown on the plans. The design is an economical one for the style of structure and complies with requirements of the current AASHTO Standard Specifications for Highway Bridges.

The designer's Illinois structural engineer seal, as well as the written signature, date of signing, and expiration date of the license must accompany the above certification. This certification does not limit the responsibilities of the designer under 225 ILCS 325.

d. IDOT's Standard Bridge Plans. IDOT's Standard Bridge Plans have been accepted as structurally adequate and do not normally require a structural engineer's seal or certification. However, when the Standard Plans have been altered (e.g., modification of the substructure for use with a standard superstructure plan), a structural engineer's seal and certification must be affixed to the individual plan sheets of the special design. The licensee's written signature, date of signing, and expiration date of the license must also be included.

A foundation review by BBS Foundations Unit is required for all structures using IDOT's Standard Bridge Plans, unless the local agency elects to have an Illinois

licensed structural engineer perform this review. In order to facilitate this review, submission of foundation borings must be included with the Preliminary Bridge Design and Hydraulic Report (Form BLR 10210).

2. Hydraulic Responsibility. The responsibility for hydraulic and hydrological analyses and the geometrics of a bridge/box culvert lies with a professional engineer. Therefore, all structure plans (including certified and Standard Bridge Plans) require a professional engineer's seal, signature, date of signing, and expiration date of the license. The local agency and the designer are responsible for ensuring that the PS&E conform to the Division of Water Resources construction permit and the approved Preliminary Bridge Design and Hydraulic Report.

   In addition, if MFT funds are used to construct municipal storm sewer outfalls outside the corporate limits, ensure that the plans that are submitted to the district are accompanied by copies of the following:

   - an ordinance prohibiting connection by other than a government agency to the outfall system outside the corporate limits, and
   - maintenance agreements.

3. IDOT Review for MFT and TBP Projects. The district will approve all plans MFT- and TBP-funded structures after any structural review has been completed by the BBS.

4. IDOT Review of County and Road District Bridges. The *Illinois Compiled Statutes* (605 ILCS 5/5-205.1) require that plans, specifications, and estimates for all bridges and culverts with a clear span length of more than 30 ft (9 m) to be built by the county, or by one or more road districts, be submitted to IDOT for review and approval, irrespective of funding.

   For bridges and culverts that will be constructed with funds that IDOT does not supervise, submit two sets of plans directly to the BBS and forward a copy of the transmittal letter to the district. The BBS will retain one set of plans and return the other set to the county engineer.

5. Preliminary Bridge Design and Hydraulic Report (Form BLR 10210) Approval. After IDOT approval of Form BLR 10210, the local agency will not be required to submit the design plans for structural review except for the following situations:

   - when the plans are to be signed and sealed by the Engineer of Bureau of Bridges and Structures (for local agencies who have prepared the plans using an non-structural engineer);
   - for complex, unique, or major bridges; and/or
   - for streets over State highways.

11-7.04 Approval of Contract Plans

The district will review and approval the plans, special provisions, and the local agency's estimate for all projects, excluding railroad crossing improvements. After approval, the project can be scheduled for a letting.